

U.S. Patent Application No. 10/698,897
Response to Final Office Action mailed on June 6, 2006
Response dated August 7, 2006

REMARKS

Claims 1-18 are pending.

Rejections Under Section 35 U.S.C. §103

Claims 1-18 were rejected under 35 U.S.C. section 103 as being unpatentable over Saulsbury et al. (U.S. Patent No. 5,900,011) ("Saulsbury"), in view of Lamberts (U.S. Patent No. 6,418,510) ("Lamberts") and further in view of Smith (U.S. Patent No. 5,394,531) ("Smith"). Applicants respectfully traverse these rejections as well as the suggestions used by the Office to support these rejections. As discussed below, Applicants respectfully submit that the cited prior art references do not disclose or suggest all of the features of the claimed inventions. Therefore, the Office has failed to put forth a prima facie showing of obviousness as is required in a section 103 rejection.

With respect to claims 1 and 16, Applicants respectfully traverse the suggestions made by the Office and respectfully submit that the Office has not shown that all of the features of the claimed inventions are disclosed or suggested by the cited prior art references. Applicants respectfully submit that the portions of Saulsbury (Figure 1, #104; Col 2, lines 29-33) cited by the Office do not disclose a partitioned cache as suggested by the Office. Applicants respectfully submit that the cited portion of Saulsbury discloses a memory system made up of multiple banks with each of the banks holding data associated with a corresponding portion of the address space. The memory system of Saulsbury is not equivalent to the cache of the claimed invention. First, the cache as claimed herein temporarily holds a portion of data in the memory system that is likely to be used again. Second, the contents of the cache as claimed herein depends on the usage

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pattern, and varies dynamically. Third, the cache as claimed herein is dynamically partitioned such that the size of each partition of the cache is not fixed, and the contents of each partition of the cache varies over time. Specifically, each partition of the cache does not hold data associated with a corresponding portion of the address space.

Moreover, Applicants respectfully submit that the Office cited portions of Saulsbury (Figure 1 #106; Col 2, lines 34-38) do not disclose a partitioned phantom cache. The portions of Saulsbury cited by the Office disclose a victim cache that holds a subset of the data in the memory system. The victim cache of Saulsbury is not equivalent to the partitioned cache of the current invention. First, as stated on the third paragraph of page 7 of the specification as-filed in the present application, the phantom cache of the claimed invention is phantom in that it does not contain any data but merely remembers which blocks it contains. The phantom cache as claimed is not a victim cache as described by Saulsbury because the phantom cache does not contain any data but tracks which blocks it contains. Second, as explained above, the cache of the claimed invention is dynamically partitioned such that the size of each partition of the cache is not fixed, and the contents of each partition of the cache varies over time. The victim cache of Saulsbury, on the other hand, contains a number of cache sub-lines each containing a cache sub-line worth of data.

In addition, Applicants further submit that the cited portions of Saulsbury (Col 2, lines 37-38) do not disclose that the partitions in the phantom cache correspond to the partitions in the real cache. The cited portions of Saulsbury merely teach that the victim cache contains cache sub-lines, each of which holds a cache sub-line worth of data located at some address in the memory system. The cache sub-line as described in

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Saulsbury is not equivalent to a partition of the cache in the claimed invention. The cache sub-line of Saulsbury is a fixed unit of data that is brought into the cache or replaced from the cache (Saulsbury Col 2, lines 44-51). As explained above, the cache of the claimed invention is dynamically partitioned such that the size of each partition of the cache is not fixed. The bank in the memory system of Saulsbury is not equivalent to the partition in the real cache in the claimed invention. As discussed above, the bank as described in Saulsbury holds data associated with a corresponding portion of the address space while the cache of the claimed invention temporarily holds a portion of data in the memory system that is likely to be used again. Furthermore, the contents of the cache of claimed invention depends on the usage pattern, and varies dynamically. Moreover, the cache of the claimed invention is dynamically partitioned such that the size of each partition of the cache is not fixed, and the contents of each partition of the cache varies over time, and each partition of the cache does not hold data associated with a corresponding portion of the address space.

The relationship between the memory system and the victim cache as described in Saulsbury is not equivalent to the relationship between the real cache and the phantom cache in the claimed invention. The victim cache of Saulsbury holds a subset of the data that is located at some address in the memory system while in contrast there is no overlap between the contents of the real and phantom cache of the claimed invention.

With respect to the portions of Lamberts as cited by the Office, Applicants respectfully submit that Lamberts: Col 4, lines 11-18 does not teach storing data in each of the real cache partitions according to a replacement cost of the data. The cited

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portions of Lamberts merely teach a cache management method that makes cache decisions based on the access time of data. There is no mention of partitioning the cache.

With respect to the portions of Smith as cited by the Office, Applicants respectfully submit that Smith (Col 2, lines 62-68) does not teach that the size of the real cache partitions are adjusted based on the replacement cost of the data. As stated in the Office Action, Smith refers to the partition's cost value as a hit/miss ratio, which is based on the number of times a data block is requested. The hit/miss ratio, however, is not the replacement cost of the data. The hit/miss ratio is the fraction of times a data block is requested that the data block is found in the cache. The hit/miss ratio is a measure of the effectiveness of the cache, not the replacement cost of the data. As stated in the first paragraph of the Detailed Description section of the present patent application as-filed, the replacement cost of a block of data is the cost saved by caching that block of data or, in other words, the benefit of caching that block of data. The replacement cost is clearly different from the hit/miss ratio.

As stated in the Office Action, the motivation of Smith is to increase the hit/miss ratio of the data stored in a cache, but the cost-adaptive techniques of Lamberts run counter to that. A reason to consider replacement cost in caching decisions would be to preferentially cache data that is more costly to replace at the expense of not caching other data that may be referenced more frequently but are less costly to replace, or in other words, at the expense of reducing the hit/miss ratio. Therefore, Applicants respectfully submit that there is no motivation to combine all of cited prior art references as suggested by the Office.

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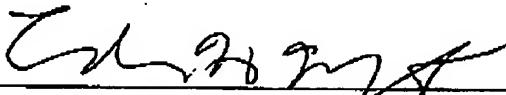
Consequently, because the cited prior art references do not disclose or suggest all of features of claims 1 and 16 and there is no motivation to combine all of the references as suggested by the Office, Applicants respectfully submit that the Office has failed to provide a *prima facie* case of obviousness as is required under a section 103 rejection. Therefore, Applicants respectfully request that the Office withdraw the section 103 rejections.

Applicants respectfully submit that all of the dependent claims are allowable for at least the same reasons as the independent claims.

It is respectfully submitted that all of the pending claims are allowable, and accordingly, a notice of allowance is respectfully requested. If any fees are due in connection with filing this paper, the Commissioner is authorized to charge Deposit Account No. 09-0441.

Respectfully submitted,

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